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### LXI. C.- MATERIALS SELECTION AND DEVELOPMENT FOR CENTRIFUGAL COMPRESSORS OPERATING IN EXTREME SOUR & ACID GAS SERVICE

### 1.- INTRODUCTION

#### 2.- DESIGN SPACE

- 2.1, Condensed Water or Moisture
- 2.2.- The partial pressures of acid gas and the related corrosion mechanism
- 2.3.- Contaminants in the water (i.e. Chlorides)
- 2.4.- Stress distribution

3.- MATERIAL SELECTION BY STANDARDS

**4.- FIELD EXPERIENCE** 

5.-RISK MANAGEMENT BY FIT-FOR-PURPOSE MATERIAL SELECTION

5.1.- Testing Experience

#### 6.- RECENT DEVELOPMENT IN MATERIAL FOR CC

- 6.1.- Wrought and Casted Nickel-Based Alloys
- 6.2.- Commercial Alloys

6.3.- Bridge Alloys

6.4.- Advanced Manufacturing Processes

- 6.5.- Powder Metallurgy HIP (Hot Isostatic Pressing)
- 6.6.- Additive Manufacturing

#### 7.- CONCLUSIONS

8.- NOMENCLATURE

# LXI. D.- HOW TO SELECT MATERIALS FOR CENTRIFUGAL COMPRESSORS

1.- PROPERTIES WHICH REQUIRE CONSIDERATION 2.- ASPECTS TO BE CONSIDERED

#### **3.- IMPELLER FABRICATION**

- 4.- IMPELLER MATERIALS
- **5.- SULFIDE CRACKING** 
  - 5.1.- Background.
  - 5.2.- Essential features.
  - 5.3.- Inhibition.
  - 5.4.- Metallurgical condition.
  - 5.5.- Effect of pH.
  - 5.6.- Effect of temperature.
  - 5.7.- Service experience.
  - 5.8.- Prevention.

#### 6.- HYDROGEN ENVIRONMENT EMBRITTLEMENT

- 6.1.- Types of hydrogen environment embrittlement.
- 6.2.- Features of hydrogen environment embrittlement.
- 6.3.- Categories of hydrogen environment embrittlement.
- 6.4.- Effect of variables.
- 6.5.- Prevention.

#### 7.- LOW TEMPERATURE OPERATION BRITTLE FAILURE

- 7.1.- Background.
- 7.2.- Criteria for resistance to brittle fracture.
- 7.3.- Materials and fabricating procedures.
- 7.4.- Materials for rotating parts.
- 8.- STABILITY
- 9.- ROTATING PARTS.